

## PATENT COOPERATION TREATY



Translation

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RFP 16506-WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/013823	International filing date (day/month/year) 06 December 2003 (06.12.2003)	Priority date (day/month/year) 17 January 2003 (17.01.2003)
International Patent Classification (IPC) or national classification and IPC C04B 35/043		
Applicant REFRACTORY INTELLECTUAL PROPERTY GMBH & CO. KG		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.  
  
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 29 July 2004 (29.07.2004)	Date of completion of this report 01 September 2005 (01.09.2005)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/013823

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
pages \_\_\_\_\_ 1-10 \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☒ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement under Article 19  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_ 1-20 \_\_\_\_\_, filed with the letter of \_\_\_\_\_ 01 March 2005 (01.03.2005)
- ☒ the drawings:  
pages \_\_\_\_\_ 1 \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/13823

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

### **Amendments Filed (PCT Article 34(2)(b))**

The amendments submitted with the letter of 28 February 2005 introduce substantive matter that, contrary to PCT Article 34(2)(b), goes beyond the disclosure in the international application as filed. The amendment in question is as follows: the omission from claim 5 of the feature "d) up to 10 percent by weight of miscellaneous".

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/13823

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	5-20	YES
	Claims	1-4	NO
Inventive step (IS)	Claims		YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims		NO

## 2. Citations and explanations

Reference is made to the following documents:

D1: GB 897 357 A (KAISER ALUMINIUM CHEM CORP) 23 May 1962  
(1962-05-23)

D2: US-A-3 210 205 (SCHURTZ ROBERT F) 5 October 1965  
(1965-10-05)

D3: GB 668 187 A (CANADIAN REFRACTORIES LTD) 12 March 1952  
(1952-03-12)

D4: GB 938 040 A (CANADIAN REFRACTORIES LTD) 25 September  
1963 (1963-09-25)

D5: EP-A-0 019 995 (KAISER ALUMINIUM CHEM CORP)  
10 December 1980 (1980-12-10)

D6: US-A-3 948 671 (GUILE DONALD L ET AL) 6 April 1976  
(1976-04-06)

## 1. Novelty (EPC Article 54)

2.1. Claim 5 has been interpreted as though the claim still included the words "d) up to 10 percent by weight of miscellaneous".

2.2. With reference to claims 1 and 5, the applicant is asked to note PCT Guidelines, paragraph III-4.7a: "Characterization of a product primarily by its parameters should be allowed only if the invention cannot be adequately defined in any other way". The

applicant is attempting to define a ceramic in terms of the test value  $T_{0.5}$ . Said test value is the result of a particular composition and grain structure of the fired ceramic. Whether or not the applicant has actually defined this particular composition and grain structure in the application is not relevant to the issue of whether it is appropriate to consider said parameter as a possible differentiating feature. The question is merely: Could the cause of this parameter be adequately defined in terms of composition and grain structure?

On page 4 of the application, the applicant explains how the desired properties were obtained. The addition of  $Fe_2O_3$  during sintering results in the formation of a dicalcium ferrite phase. The presence of this phase gives the molded body the desired properties, such as the test value  $T_{0.5}$ . Said phase is automatically formed during sintering when both  $CaO$  and  $Fe_2O_3$  are present in the correct ratio. The aforementioned test value  $T_{0.5}$  can thus be clearly defined by means of the composition if the presence of calcium diferrite is mentioned, and thus it cannot be used as a differentiating feature over the prior art.

1.3. The sintering temperature and grain size of the particles in a batch are also not considered to be features of the fired ceramic molded body. Thus claim 1 still does not define anything more than a fired ceramic molded body with the composition mentioned in claim 1.

1.4. The feature according to claim 4 is a feature of the batch but not a feature of the fired ceramic molded

body. The degree of purity of one of the starting powders can no longer be determined in the sintered molded body after firing because the various starting powders have been mixed.

- 1.5. Document D1 mentions two batches (charge III: page 6, lines 92-97, and charge V: page 7, lines 1-6) that include all of the features of claim 1 of the application (page 6, lines 49-56). The batch of charge V has the following overall composition (expressed in percent by weight): 55.8% MgO, 37.8% CaO, 3.5% Fe<sub>2</sub>O<sub>3</sub>, 2.6% SiO<sub>2</sub> and 0.4% Al<sub>2</sub>O<sub>3</sub>. The periclase component in "charge V" has a magnesium oxide content of 92.1%, and so charge V includes a magnesia-containing component with a degree of purity of > 90 percent by weight MgO. Furthermore, said periclase component has a grain size of < 0.5 mm (35 mesh) and a large grain size fraction of < 0.15 mm (100 mesh). The CaO-containing component of charge V (this component is charge I, fired dolomite) is the course fraction in this batch and has a much larger grain size than the MgO-containing component.

Moreover, the periclase fraction of charge V also contains CaO (1.2 percent by weight). This means that said periclase fraction is also a CaO-containing component. The word "containing" means nothing more than the fact that the component should contain CaO and says nothing about the CaO content. Therefore, 1.2 percent by weight of CaO is adequate, and even 1 ppm would be sufficient. Naturally, the dolomite fraction contains both CaO and MgO, and it can thus also be considered an MgO-containing component. Some of the dolomite fraction has a grain size of > 2 mm because the maximum grain size of this fraction is

5 mm (4 mesh). This means that charge V also has a CaO-containing component with a grain size of  $> 2$  mm. The applicant has not defined in any of the claims how large said CaO-containing and MgO-containing fractions should be.

All of the batches according to document D1 contain coal tar as a binding agent, are pressed into a molded body and are then fired (page 6, lines 56-68). Claim 18 of document D1 mentions that the fire-proof ceramics that are produced are dense. It can therefore be assumed that the raw density of the ceramic produced from charge V is greater than  $3 \text{ g/cm}^3$ .

In light of the content of document D1, the present application does not satisfy the requirements of PCT Article 33(1) because the subject matter of claims 1-4 is not novel within the meaning of PCT Article 33(2).

- 1.6. The first composition according to document D2 (formulation 1) has the following overall composition (derived from table 1, expressed in percent by weight): 61.4% MgO, 32.9% CaO, 2.4%  $\text{Fe}_2\text{O}_3$ , 0.1% FeO, 2.5%  $\text{SiO}_2$ , 0.6%  $\text{Al}_2\text{O}_3$  and 0.1%  $\text{Cr}_2\text{O}_3$ . This batch is composed of four components, all of which contain CaO and MgO: 15 percent by weight of a fired dolomite component that is  $< 9.53$  mm and  $> 4.76$  mm, 22 percent by weight of a fired dolomite component that is  $< 4.76$  mm and  $> 3.36$  mm, 23 percent by weight of a fired dolomite component that is  $< 1.41$  mm and 40 percent by weight of a periclase component that is  $< 0.074$  mm. Furthermore, the periclase component has an MgO content of  $> 90$  percent by weight.

This batch and a binding agent were pressed into a cylinder (column 5, lines 40-43) and sintered at various temperatures, such as 2500°F (= 1371°C).

In light of the content of document D2, the present application does not satisfy the requirements of PCT Article 33(1) because the subject matter of claims 1-4 is not novel within the meaning of PCT Article 33(2).

## 2. Inventive Step (PCT Article 33(3))

- 2.1. The batch in example 3 of document D3 has the following overall composition (expressed in weight percent): 77% MgO, 12% CaO, 4% Fe<sub>2</sub>O<sub>3</sub> and 7% SiO<sub>2</sub>. The dolomite component in example 3 has a magnesium oxide content of 83 percent by weight, a calcium oxide content of 10 percent by weight and a grain size of 3 mm (6 mesh). The other component, which contains both CaO and MgO, has a grain size of < 2 mm (10 mesh) and > 0.6 mm (28 mesh).

The batch in example 3 of document D3 contains the second component as a binding agent, is pressed into a molded body and is then fired at 1500°C into a ceramic with a high density. Because the ceramic has been fired at a temperature higher than 1400°C and has the same composition as the composition according to the application (as defined in claims 1-20), it should also have the same phase composition (and properties). However, a dicalcium silicate phase and a magnesium ferrite phase are formed instead of a dicalcium ferrite phase. This difference in phase composition indicates that the independent claims of the application are lacking an essential feature. The fact that a dicalcium silicate phase and a magnesium



ferrite phase are formed instead of a dicalcium ferrite phase in example 3 of document D3 is probably the result of the presence of 2 percent by weight  $\text{SiO}_2$ . It thus appears to be essential that a very small amount of  $\text{SiO}_2$  is present. Therefore, claims 5-20 are not inventive because these claims lack a feature that is essential to the execution of the invention.

2.2. The application mentions on page 8 of the description that the other foreign oxides, such as  $\text{Al}_2\text{O}_3$ ,  $\text{MnO}$  and  $\text{SiO}_2$ , can be adjusted to values of < 1 percent by weight. If claims 1 and 5 had defined that there were less than 1 percent by weight of foreign oxides, then the compositions according to claims 1-20 would differ from the composition in example 3 of D3, and this lacking essential feature would be incorporated into claims 1 and 5. It appears that claims 5-19 would be inventive in such a case.

2.3. In order to render claims 1-4 and 20 novel and inventive, the applicant should also include in claim 1 the fact that the fired ceramic molded body contains dicalcium ferrite.